Journal of Agricultural and Applied Economics, 42,3(August 2010):501–515

Average Crop Revenue Election, Crop Insurance, and Supplemental Revenue Assistance: Interactions and Overlap for Illinois and Kansas Farm Program Crops

Carl Zulauf, Gary Schnitkey, and Michael Langemeier

Farm-level data from Illinois and Kansas for the 1991–2007 crops are used to examine the interaction and overlap among crop revenue insurance, Supplemental Revenue Assistance (SURE), and Average Crop Revenue Election (ACRE). Compared with 75% Crop Revenue Coverage Insurance (75% CRCP), ACRE provides more payments and has a greater impact on minimum farm revenue for the Illinois farms. In contrast, for the Kansas farms, 75% CRCP has the greater impact. SURE's relative impact on the Illinois and Kansas farms depends on the metric. The overlap in payments from ACRE and 75% CRCP resulting from covering the same part of the revenue risk distribution is estimated to be less than 5% of ACRE payments. Several proposals for improving the farm safety net are discussed.

Key Words: Average Crop Revenue Election Program (ACRE), Crop Revenue Coverage Insurance (CRCP), farm policy, *Food Conservation and Energy Act of 2008*, Supplemental Revenue Assistance (SURE)

JEL Classifications: Q18, Q12

The *Food, Conservation, and Energy Act of 2008* (2008 Farm Bill) (U.S. Congress, 2008) authorized two new programs designed to help farmers manage risk. One is Supplemental Revenue Assistance (SURE). SURE is a whole-farm crop disaster assistance program tied to crop insurance for insurable crops and to the noninsured Crop Assistance Program (NAP) for noninsurable crops. Eligibility for SURE requires the occurrence of a disaster that adversely affects production, but, in a key difference with *ad hoc* disaster assistance programs previously authorized by Congress, payments are based on shortfalls in revenue relative to crop insurance guarantees.

The second new program is Average Crop Revenue Election (ACRE). Farm program participants can choose ACRE or a traditional program suite. The traditional suite consists of the fixed direct payment, marketing loan, and price countercyclical programs. The ACRE suite consists of 80% of the traditional program's direct payments, a marketing loan at 70% of the traditional program's loan rate, and a new state revenue program.

Carl Zulauf is professor, Department of Agricultural, Environmental, and Development Economics, Ohio State University, Columbus, Ohio. Gary Schnitkey is professor, Department of Agricultural and Consumer Economics, University of Illinois at Urbana–Champaign, Urbana, Illinois. Michael Langemeier is professor, Department of Agricultural Economics, Kansas State University, Manhattan, Kansas.

The authors thank Allan Lines, Art Barnaby, and the journal editors for their thoughtful and useful comments. The authors gratefully acknowledge support provided by the USDA Cooperative State Research, Education & Extension Service, Hatch project #0198384, the Ohio Agricultural Research and Development Center.

Because crop revenue insurance, SURE, and ACRE all address revenue risk, concern has arisen about their interrelationships, in particular overlap between revenue insurance and ACRE. This article examines the interrelationships among the three programs. Specifically, payments are calculated using stylized versions of the programs that capture key policy parameters and farm-level data from Illinois and Kansas for the 1991–2007 crops. Also examined is the impact of the payments on farm revenue risk. To allow us to focus on these performance characteristics, we do not model the signup decision of producers, but instead assume that all farmers participate in the stylized versions of crop revenue insurance, SURE, and ACRE.

Key parameters of SURE and ACRE are discussed in the next two sections. The two programs then are compared with each other and with crop revenue insurance. The analytical procedures are presented followed by a discussion of the analytical results. The concluding section focuses on policy design issues and recommendations.

Overview of SURE

SURE is a whole-farm crop disaster assistance program (U.S. Department of Agriculture (USDA), Farm Service Agency (FSA), 2010). The whole farm includes all farmland in all counties regardless of tenure status. Three eligibility conditions exist. Economically significant crops on the farm must be covered by crop insurance or enrolled in the noninsured Crop Assistance Program (NAP). An economically significant crop accounts for at least 5% of the whole crop farm's expected revenue. The farm must have acres in a county declared a disaster county by the Secretary of Agriculture or contiguous to such a county or production on the farm, as measured by total revenue, declines by 50% or more resulting from a natural disaster.[1] Last, a 10% production loss, as measured by quantity, must occur for at least one economically significant crop on the farm as a result of a natural disaster.

For the sake of simplicity, the following discussion assumes that the farm plants only insurable crops, that each crop meets the definition of an economically significant crop, and that the farmer purchases Crop Revenue Coverage Insurance for all crops on the farm.

(1) SURE payment for whole crop farm j and crop year t = (60% · [SURE revenue guarantee$_{jt}$ – SURE total crop revenue$_{jt}$])

(2) SURE total crop revenue$_{jt}$ = Σ(MAX[insurance indemnities$_{jt}$ – producer paid premiums$_{jt}$, 0], prevented planting payments$_{jt}$, other Federal disaster aid for same loss$_{jt}$, 15% of direct payments$_{jt}$, counter-cyclical payments$_{jt}$, ACRE payments$_{jt}$, marketing loan payments$_{jt}$, crop value$_{jst}$), where:

(3) Crop value$_{jst}$ for crop s = (harvested acres$_{jst}$ · yield$_{jst}$ · U.S. crop marketing year price$_{st}$ adjusted for applicable disaster-related local or regional quality losses or disaster-related excess moisture)

SURE revenue guarantee$_{jt}$ is the sum of the SURE revenue guarantee for each crop, where:

(4) SURE revenue guarantee for crop s on whole crop farm j and crop year t = {(planted acres$_{jst}$ + prevented planted acres$_{jst}$) · insurance coverage level$_{jst}$ · MAX[actual production history (APH insurance) yield$_{jst}$, counter-cyclical payment yield$_{jst}$] · MAX[base insurance price$_{jst}$, harvest insurance price$_{jst}$] · 115%}[2]

SURE revenue guarantee for whole crop farm j and crop year t cannot exceed 90% of the farm's expected revenue, which is the sum of the expected revenue for each crop on the farm, where:

(5) SURE expected revenue for crop s on whole crop farm j in crop year t = {(planted

[1] Disasters include damaging weather such as drought, excessive moisture, excessive heat, hail, freeze, and weather-related irrigation water rationing; other adverse natural occurrences such as earthquakes and related conditions that occur as a result of the preceding natural events and exacerbate the condition of the crop such as disease.

[2] The *American Recovery and Reinvestment Act of 2009* increased the multiplicative factor from 115 to 120 percent for the 2008 program for crops with insurance policies providing at least 70% yield coverage and 100% price coverage (USDA, FSA, 2010).

$acres_{jst}$ + prevented planted $acres_{jst}$) · MAX[APH insurance $yield_{jst}$, counter-cyclical payment $yield_{jst}$] · MAX[base insurance $price_{jst}$, harvest insurance $price_{jst}$]}

Equations 1–4 reveal that, once its eligibility conditions are met, SURE makes payments for both low production and prices. Moreover, payments by SURE are a subsidy to both buy insurance and buy it at higher coverage levels. As a simple illustration, when SURE's eligibility conditions are met and assuming only one crop and the purchase of 75% coverage insurance, SURE increases the farm's coverage level to 86.5% (75% times 115%).

SURE payments are limited to $100,000 per eligible producer minus any payments from these other three programs: Livestock Indemnity, Livestock Forage Disaster, and Emergency Assistance for Livestock, Honey Bees, and Farm-Raised Fish.

Overview of ACRE

The 2008 Farm Bill gives farmers and landowners a choice between the traditional farm program suite and an ACRE farm program suite (USDA, FSA, 2009). Twenty-two crops are eligible for election into ACRE, including barley, corn, upland cotton, oats, peanuts, grain sorghum, soybeans, and wheat. The unit of election is a farm as recorded at the Farm Service Agency (an FSA farm). As long as an FSA farm is not in ACRE, election of ACRE remains open. Once ACRE is elected, an FSA farm is enrolled through the 2012 crop.

ACRE must be elected for all eligible crops grown on a FSA farm, but payments are crop-specific. An ACRE payment can occur if a state's actual revenue per planted acre is less than the state's revenue risk assistance level per planted acre for a crop for a crop year where:

(6) ACRE revenue risk assistance level per planted acre for state k, crop s, and crop year t = (90% · Olympic average yield per planted acre for 5 most recent prior crop $years_{kst}$ · average U.S. cash price for 2 most recent prior crop $years_{st}$).

(7) ACRE actual state revenue per planted acre for state k, crop s, and crop year t = (yield per planted $acre_{kst}$ · Max[U.S. cash $price_{st}$, 70% of U.S. marketing loan $rate_{st}$])

ACRE's state revenue risk assistance level cannot increase more than 10% from the prior year's level (called a cap) nor decrease more than 10% from the prior year's level (called a cup). The 10% cap and cup, along with the use of historical moving averages, means that the ACRE state revenue assistance level may adjust more slowly than changes in market revenue. However, no floor exists on the ACRE assistance level.

An FSA farm eligibility condition exists. Specifically, an FSA farm's actual revenue must be less than the FSA farm's benchmark revenue for the crop where:

(8) ACRE benchmark revenue per planted acre for FSA farm i for crop s and crop year t = ([Olympic average planted yield for 5 most recent prior crop $years_{ist}$ · average U.S. cash price for 2 most recent prior crop $years_{st}$] + per acre farmer-paid insurance $premium_{ist}$)

(9) Actual revenue per planted acre for FSA farm i for crop s and crop year t = (yield per planted $acre_{ist}$ · U.S. cash $price_{st}$)

An ACRE revenue payment is made to an FSA farm for an eligible crop when both the state payment condition and FSA farm eligibility condition are met. The ACRE state revenue payment per planted acre is capped at 25% of the state revenue risk assistance level.

(10) ACRE revenue payment for eligible FSA farm i in state k for crop s and crop year t = ([83.3% {85% for 2012 crop} · FSA farm planted $acres_{ist}$] · MIN[ACRE state revenue risk assistance level per planted $acre_{kst}$ – actual state revenue per planted $acre_{kst}$, 25% · ACRE state revenue risk assistance level per planted $acre_{kst}$] · [Olympic average for 5 most recent prior FSA farm $yields_{ist}$/Olympic average for 5 most recent prior state $yields_{jst}$])

Although ACRE revenue payments depend on the acres planted to the eligible crop, a FSA farm cannot receive ACRE payments on more acres than the FSA farm's total base acres. For most eligible crops, planted acres equal the

conventional definition. However, for barley, corn, oats, grain sorghum, and wheat, FSA defined planted acres as harvested acres plus acres reported as failed acres to FSA. Failed acres are acres intended for harvest but not harvested.

For each payment entity, ACRE fixed direct payments cannot exceed $32,000, or 20% less than the $40,000 limit on traditional program direct payments. For each payment entity, ACRE revenue payments cannot exceed $65,000, the limit on counter-cyclical payments plus an amount equal to the payment entity's 20% reduction in direct payments.

Comparison of Revenue Insurance, SURE, and ACRE

Revenue insurance, SURE, and ACRE address crop revenue risk. In contrast to the marketing loan and counter-cyclical programs, their assistance levels are not fixed but change with market conditions, and no floor exists on revenue. Thus, although revenue insurance, SURE, and ACRE likely give farmers a longer time to adjust to a longer-term decline in farm revenue, farmers eventually will have to adjust to the decline. Moreover, everything else constant, if revenue insurance, SURE, or ACRE causes production at the market level to increase, the resulting decrease in price will translate into a lower assistance level, thus mitigating at least some of the increase in production.

Despite the similarities noted in the previous paragraph, crop revenue insurance, SURE, and ACRE differ on important parameters. One is the unit of coverage. Revenue insurance can be elected either at the individual field level, for all acres planted to a crop within a county, or at the county level. SURE's unit of coverage is the whole-farm crop operation, which can extend across county and state boundaries. ACRE's unit of coverage is the crop at the state level subject to the FSA farm eligibility condition.

Differences exist in the period of coverage and type of price used. Insurance addresses revenue risks that occur between the two periods of time that determine 1) the average futures price used to set the revenue guarantee; and 2) the average futures price used to calculate the crop's final value for payment purposes. These two periods span a time from before planting to harvest. SURE uses insurance's preplant futures price to establish its revenue guarantee but uses the U.S. crop marketing year average cash price, with some adjustments, to calculate a crop's final value for payment purposes. SURE's coverage period thus spans both the crop's growing season and postharvest marketing year, but only if its three eligibility conditions are met. ACRE only uses U.S. crop marketing year cash prices. Hence, ACRE's period of coverage is the crop marketing year. However, it is important to note that one factor determining crop year revenue is the crop yield obtained during the growing season.

A fourth difference involves the mechanism used to set the risk assistance level. Crop insurance/SURE's coverage level is reset each year based on the futures prices during insurance's preplant price discovery period. In contrast, a 10% cap and cup limits the annual changes in ACRE's state revenue risk assistance level. On average, for nine large acreage crops, crop insurance's preplant price was 10% or more below the prior year's preplant price in 26% of the 1974–2009 crop years (see Figure 1). The range across the crops was 23–32%. Thus, ACRE's 10% cup on the annual decline in its assistance level is a potentially valuable risk management feature that can result in ACRE providing more protection than crop insurance/SURE against larger declines in revenue that last several years.

A fifth difference is the percent of revenue covered. It determines the percent decline needed to trigger a payment. For crop insurance, a farmer elects this level. Maximum coverage level for individual farm insurance is 85%. Coverage level for county insurance is 90%. Assuming individual farm insurance,[3] SURE's coverage level is 115% of the insurance level elected by the farmer with a cap at 90% of expected farm revenue. ACRE's coverage level is 90%.

The different parameters, which are summarized in Table 1, may seem unnecessary or

[3] At the time this article was written, the relationship between county insurance and SURE had not been determined.

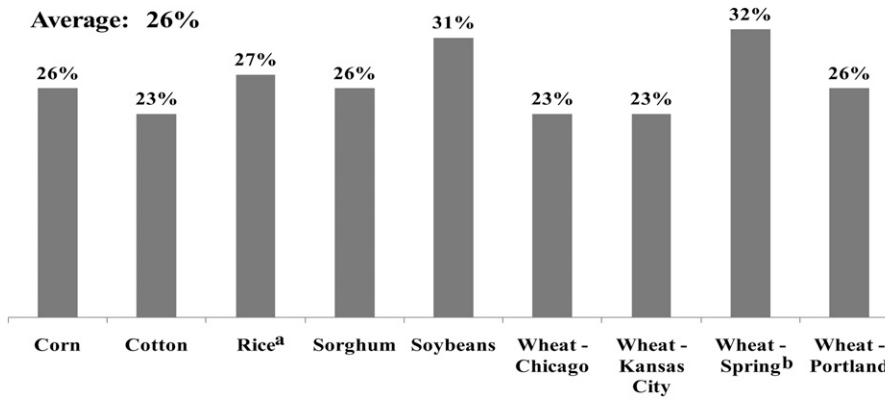

Figure 1. Share of Years in Which the Insurance Plant Price Declined at Least 10% from the Prior Year's Insurance Plant Price, Selected Crops, U.S., 1974–2009 Crop Years (Sources: original calculation using data from the USDA, RMA, and a data set maintained at Kansas State University)
[a] Data for rice are for the 1987–2009 crop years.
[b] Data for spring wheat are for the 1975–2009 crop years.

confusing. However, they reflect in part the different objectives of the programs. Crop revenue insurance focuses primarily on the idiosyncratic risk that a crop's revenue declines for an individual farm during the growing season. SURE is a supplement to crop insurance that extends its coverage to the crop marketing year and the insurance deductible. Its focus is idiosyncratic risk, but at the whole-farm crop level. In contrast, ACRE's focus is systemic risk, in particular that crop marketing year revenue at the state level declines for 1 to a short period of years (Zulauf, Dicks, and Vitale, 2008). Nevertheless, the interrelationship, including overlap, among the three programs is an issue.

Analytical Procedures

The analysis uses Illinois and Kansas farm level data compiled by the Illinois Farm Business

Table 1. Comparison of Program Parameters for Crop Revenue Insurance, SURE, and ACRE

Program Parameter	Revenue Insurance	SURE[a]	ACRE
Area covered	Individual field, or enterprise, or county	Whole crop farm	State but with a farm eligibility condition
Prices used to set assistance level	Futures	Futures	U.S. marketing year cash
Final value	Futures	U.S. marketing year cash	U.S. marketing year cash
Period covered	Growing season	Growing season and marketing year	Marketing year
Cap on decline in assistance level	None	None	10%
Percent of coverage	Farmer elects, Individual: maximum is 85%; County: 90%	Individual: 115% of farmer elected level up to 90% of expected whole-farm crop revenue	90%

[a] At the time this article was written, the relationship between county crop insurance and SURE had not been determined.
Sources: U.S. Department of Agriculture, Farm Service Agency (2009, 2010) and U.S. Department of Agriculture, Risk Management Agency (2010).

Farm Management (FBFM) program (Schnitkey, 2009) and the Kansas Farm Management Association (KFMA) (Langemeier, 2009). FBFM is a farmer-owned cooperative that has a working relationship with the University of Illinois at Urbana–Champaign. Farmer members maintain production and financial records for their farm. At the end of the calendar year, financial statements and production records are prepared. They can be used to assess farm and management performance. In addition, aggregate databases of crop and livestock production, receipts, expenses, inventories, and capital accounts are produced to create farm benchmarks. To be included in the database, FBFM personnel must certify a farm's data are reliable and usable. The data chosen for analysis cover periods over which preparation of the data and computations are consistent. The KFMA data are developed in a similar fashion (Langemeier, 2005).

The historical period chosen for this analysis depended on two considerations. One involves a tradeoff. Specifically, a longer observation period translates into larger degrees of freedom for an individual farm. However, farm data tend not to be usable every year. Thus, a longer observation period results in a smaller number of farms available for analysis. The second consideration is that the *Federal Agriculture Improvement and Reform Act of 1996* eliminated annual land set asides; gave farmers additional flexibility to make planting decisions, except for restrictions on planting fruits, vegetables, and wild rice on base acreage; eliminated most public stocks programs; and instituted fixed income payments (Nelson and Schertz, 1996). These substantive policy changes had implications for the impact of farm programs on production decisions and market prices (Orden, Paarlberg, and Roe, 1999; Schertz and Doering, 1999). Thus, the 1996 and later crop years are more representative of current crop production incentives and market conditions than years before 1996. Given these two considerations, the observation period was determined to be from 1991 through 2007 crop years. The ending date was the last year for which information was available when the study began. The initial date means calculation of program payments begin with the 1996 crop year because 5 years are needed to calculate a farm's ACRE benchmark yield.

The Illinois and Kansas data sets were compiled somewhat differently because crop production is more homogenous in Illinois than Kansas. The Illinois data set was composed of 560 farms that had complete, verified information for corn and soybeans for all of the 1991–2007 crop years. Wheat was included to the extent information was available for the farm for the current crop year and the 5 previous crop years needed to calculate the farm's ACRE benchmark yield. A total of 115 Illinois farms had at least one observation for wheat. In contrast, the Kansas data set was compiled by crop. Specifically, each farm had complete, verified data for the crop for all of the 1991–2007 crop years. The numbers of Kansas farms by crop were dryland corn (103), irrigated corn (42), grain sorghum (168), soybeans (235), and wheat (326). In total, the Kansas data set contained 482 different farms.

The Illinois and Kansas data sets contain planted acres and yield per planted acre. The 2007 Census of Agriculture reports values for harvested acres. Thus, a direct comparison is not possible on these metrics. Nevertheless, Table 2 presents the comparison providing a perspective on the farms analyzed in this study vs. all farms in the state. With the exception of irrigated corn in Kansas, the farms in this study had more acres of the crops examined in this study than the farms enumerated by the Census. Thus, on average, the farms in this study are most likely larger than all farms in Illinois and Kansas. The yields of the Illinois farms in this study are higher than the corresponding averages from the Census. Average yields for the Kansas farms in this study are higher for dryland corn and grain sorghum but lower for the other three crops. The difference between planted and harvested yield for Kansas wheat can be attributed in part to widespread freeze damage in central and eastern Kansas in 2007, which resulted in substantial nonharvested acres. In summary, when examined as a group, the differences in acres and yields between the farms in this study and the average in the Census of Agriculture imply that the results of this study cannot be extended to farms not in this study.

The analysis is counterfactual. Revenue insurance, specifically Crop Revenue Coverage

Table 2. Comparison of Farms Examined in this Study with the State Averages from the 2007 Census of Agriculture for Farms Growing the Crop, Illinois and Kansas, 2007

	Farms in This Study, 2007		2007 Census of Agriculture	
State and Crop	Planted Acres	Yield per Planted Acre	Harvested Acres	Yield per Harvested Acre
Illinois[a]				
Corn for grain	569	187	342	172
Soybeans	368	51	244	43
Wheat	106	58	95	53
Kansas[b]				
Dryland corn for grain[c]	455	114	206	103
Irrigated corn for grain[c]	428	174	466	192
Grain sorghum for grain	261	83	231	77
Soybeans	472	29	196	32
Wheat	638	22	377	32

[a] Number of farms in the Illinois data set is 560. All planted corn and soybeans; 115 had enough information on wheat yields to be included in the analysis for at least 1 of the 12 years.

[b] Number of farms in the Kansas data set is 482. Numbers of Kansas farms by crop are dryland corn (103), irrigated corn (42), grain sorghum (168), soybeans (235), and wheat (326).

[c] For Kansas corn, the Census of Agriculture numbers are for farms that irrigated all of their corn acres and for farms that did not irrigate any of the corn acres.

Sources: Original calculations using data from the Illinois Farm Business Farm Management (FBFM) program, the Kansas Farm Management Association (KFMA), and the U.S. Department of Agriculture, National Agricultural Statistical Service 2007 Census of Agriculture.

Insurance (CRCP), SURE, and ACRE were assumed to have existed during the 1996–2007 crop years. The traditional farm program suite was assumed not to be available.

All acres were assumed to be enrolled in CRCP at the 75% coverage level (subsequently referred to as 75% CRCP). The preplant and harvest insurance prices were obtained from the U.S. Department of Agriculture, Risk Management Agency or from a data set maintained at Kansas State University (Kansas State University, Department of Agricultural Economics, 2009). The farm's expected insurance yield was an Olympic average of yields per planted acre for the 5 immediately prior crop years, which is also the farm's ACRE benchmark yield. Final crop value for insurance payment purposes was calculated using the farm's reported crop yield.

SURE payments were calculated following Equations 1–4. To simplify the calculations, crops eligible for SURE were assumed to be only corn, grain sorghum, soybeans, and wheat planted on the farm and each met the definition of economic significance. No information was available on quality losses. SURE's cap on coverage at 90% of a farm's expected farm income is not a constraint in this study because 115% of 75% is 86.25%.

Assuming that 75% CRCP was purchased for all crop acres meant that SURE's insurance eligibility condition was satisfied. Its eligibility condition of a 10% production loss on the farm was modeled as: yield of at least one crop on the farm must be less than 90% of its 5-year Olympic moving average of the most recent prior yields (i.e., the crop's Actual Production History (APH) insurance yield and ACRE benchmark yield). Regarding SURE's disaster county eligibility condition, readily available information could be found only for the 2005–2008 calendar years. Over these 4 years, more than 75% of the counties in Illinois, Kansas, and all states were declared a disaster county by the Secretary of Agriculture or were contiguous to such a county (see Table 3). Given that disaster declarations are more likely in low-yield years, that urban counties are probably less likely to be declared agricultural disaster counties because agricultural production is limited, and that the incentive to have a county declared an agricultural disaster county is greater now that SURE exits, these data suggest

Table 3. Number and Share of Counties Declared a Disaster County by the Secretary of Agriculture or Contiguous to Such a County, Illinois, Kansas, and U.S. States, 2005–2008 Calendar Years

	Number[a]			Share		
Year	Illinois	Kansas	U.S.	Illinois	Kansas	U.S.
2005	102	97	2306	100%	92%	73%
2006	45	105	2268	44%	100%	72%
2007	82	101	2510	80%	96%	80%
2008	94	66	2580	92%	63%	82%
Average	81	92	2416	79%	88%	77%

[a] Total numbers of counties by area are Illinois, 102; Kansas, 105; and U.S. states, 3,141.
Sources: Data from U.S. Department of Agriculture, Farm Service Agency.

a reasonable assumption in the absence of more complete information is that a county will be declared an agricultural disaster county or be contiguous to such a county when farms are likely to have below average yields. Thus, we assumed that the disaster county declaration for SURE eligibility was always met. Although this assumption is not unreasonable, it means that our estimate of SURE payments is on the high side.

ACRE state revenue payments were calculated using Equations 6 and 7, data from USDA, National Agricultural Statistical Service, plus state FSA failed acres for corn, grain sorghum, and wheat.[4] ACRE's farm eligibility condition and ACRE payment to the farm were calculated using Equations 8–10. The farm unit in this analysis was the farm operation. A farm operation can be composed of more than one FSA farm, especially if the farm operation includes rented land. FSA farm data were not available for the farms in this study.

Direct payments were estimated for each county in Illinois and Kansas using data from USDA, Economic Research Service (2009). Direct payments were calculated for each crop using that crop's base yields and base acres in the county. Average direct payment per planted acre in the county was calculated by weighting each crop's direct payments by the ratio of the crop's base acres to total planted acres in the county. A farm's total direct payment was obtained by multiplying its county's direct payment per planted acre times the farm's acres planted to corn, grain sorghum, soybeans, and wheat.

Each farm is assumed to have only one payment entity. SURE payments are capped at $100,000 because payments from the Livestock Indemnity, Livestock Forage Disaster, and Emergency Assistance for Livestock, Honey Bees, and Farm-Raised Fish programs were not modeled. Again, this assumption means that payments from SURE are overstated.

Results

Payments from Risk Management Programs

When interpreting the results, it is important to keep in mind that the farm observations are not from a random sample. Thus, the results cannot be extrapolated beyond the farms in this study. Nevertheless, the results are of interest because of the use of farm-level yields, the importance of Illinois and Kansas in the production of farm program crops, and the different weather patterns and soils in these two states. The latter is reflected in markedly higher yield variability on the Kansas farms (see Table 4). For example, across all years and all farms, the standard deviation of the ratio of a farm's yield divided by its Olympic average yield for the five prior crops was 46% for Kansas soybeans vs. 15% for Illinois soybeans.

Given the different variability in farm yields, it is not surprising that payments from 75% CRCP varied substantively between the two states. Annual insurance payments averaged $2,329 per

[4] Failed acres were obtained from USDA, FSA for the 1995–2008 crops. For the 1991–1994 crops, failed acres were estimated for state s and year t using the following linear regression and data for 1995–2008: failed $\text{acre}_{s,t}$ = f(planted $\text{acres}_{s,t}$ – harvested $\text{acres}_{s,t}$).

Table 4. Average and Standard Deviation of the Ratio of a Farm's Yield Divided by the Farm's Olympic Average Yield for the 5 Prior Crop Years, Selected Crops, Illinois and Kansas, 1996–2007 Crop Years

State and Crop	Average[a]	Standard Deviation[a]
Illinois[b]		
Corn	105%	16%
Soybeans	102%	15%
Wheat	104%	24%
Kansas[c]		
Dryland corn	109%	38%
Irrigated corn	105%	20%
Grain sorghum	106%	43%
Soybeans	105%	46%
Wheat	104%	50%

[a] The average and standard deviation are calculated across all years and all farms included in the data set for a crop and state.
[b] Number of farms in the Illinois data set is 560. All planted corn and soybeans; 115 had enough information on wheat yields to be included in the analysis for at least 1 of the 12 years.
[c] Number of farms in the Kansas data set is 482. Numbers of Kansas farms by crop are dryland corn (103), irrigated corn (42), grain sorghum (168), soybeans (235), and wheat (326).
Sources: Original calculations using data from the Illinois Farm Business Farm Management (FBFM) program and the Kansas Farm Management Association (KFMA).

Illinois farm vs. $9,834 per Kansas farm (see Table 5). These are gross indemnities and not net of farmer-paid premiums. Given that the crop farm is the observation unit in this study, a reasonable insurance is enterprise insurance. Enterprise insurance includes all acres planted to a crop within a county. Based on provisions in the 2008 Farm Bill, the premium subsidy for enterprise insurance at the 75% coverage level is 77% (Barnaby, 2010a). Assuming enterprise insurance and actuarially fair insurance premiums over the study period, net insurance payments, excluding administrative and service fees, were $1,793 per year for Illinois farms and $7,572 per year for Kansas farms. Compared with the crop receipts calculated for the farms in this study, these net insurance indemnities are 0.6% and 5.2% for the Illinois and Kansas farms, respectively. Receipts for an individual crop on a given farm were calculated as follows: state average price for the crop marketing year times the farm's yield per planted acre times the acres planted to the crop. Receipts for the farm were summed across the farm's corn, grain sorghum, soybeans, and wheat crops.

SURE's relative importance across the two states depends on the comparison metric. Annual SURE payments averaged $1,087 per Illinois farm vs. $1,702 per Kansas farm (see Table 5). However, SURE payments were a greater percentage addition to insurance payments in Illinois: 46.7% of 75% CRCP payments for the Illinois farms vs. 17.3% for the Kansas farms.

ACRE's 30% reduction in loan rates resulted in no marketing loan payments because the market prices observed for all crops and years exceeded the ACRE marketing loan rates. ACRE revenue payments[5] averaged $7,093 per year for the Illinois farms in this study vs. $3,392 for the Kansas farms in this study (see Table 5). The relative roles of ACRE and 75% CRCP were reversed in the two states. For Illinois farms, ACRE revenue payments averaged slightly over three times larger than gross indemnities from 75% CRCP. In contrast, for Kansas farms, gross insurance indemnities were almost three times larger than ACRE revenue payments.

This counterfactual analysis assumes the traditional farm program suite does not exist. However, under the 2008 Farm Bill, farmers can choose the traditional or ACRE farm program suites. To provide perspective on this choice, the 20% reduction in direct payments required to participate in the ACRE programs was estimated. It averaged $3,558 per year for the Illinois farms and $3,420 per year for the Kansas farms in this study. Thus, net ACRE revenue payments averaged $3,535 per year for the Illinois farms and −$28 per year for the Kansas farms. Although not the focus of this article, these net ACRE revenue payments are consistent with the relative shares of Illinois and Kansas FSA farms that elected the ACRE program suite in 2009: 17% for Illinois and 2% for Kansas (USDA, FSA, 2009).

Unsurprisingly, given the preceding discussion, ACRE had a relatively greater impact

[5] ACRE state revenue payments were made as follows: Illinois corn (1997–1999, 2005), Illinois soybeans (1998–2000), Illinois wheat (1996, 1998), Kansas dryland corn (1999, 2000, 2002, 2003), Kansas irrigated corn (1998, 1999), Kansas grain sorghum (1998–2000, 2002, 2003), Kansas soybeans (1998–2002), and Kansas wheat (1996, 2004).

Table 5. Estimated per Farm Average Annual Crop Receipts and Gross Payments by Risk Management Programs, Illinois and Kansas, 1996–2007 Crop Years

State and Crop	Crop Receipts[a]	Crop Insurance Payment[b]	SURE Payment	ACRE Revenue Payment[c]
Illinois[d]				
Corn	$191,031	$1,277		$4,436
Soybeans	$119,797	$977		$2,730
Wheat	$18,999	$658		$265
Kansas[e]				
Dryland corn	$109,821	$3,668		$1,513
Irrigated corn	$162,784	$2,524		$1,021
Grain sorghum	$47,744	$3,133		$1,659
Soybeans	$87,743	$5,393		$4,357
Wheat	$73,772	$7,554		$462
All Crops				
Illinois farms	$313,006	$2,329	$1,087	$7,093
Kansas farms	$146,969	$9,834	$1,702	$3,392
All farms	$236,202	$5,801	$1,371	$5,381

[a] Receipts for an individual crop on a given farm were estimated as follows: state average price for the crop marketing year times the farm's yield per planted acre times the acres planted to the crop. Receipts for the farm were summed across corn, grain sorghum, soybeans, and wheat planted on the farm.
[b] The insurance product was 75% Crop Revenue Coverage.
[c] Calculation of ACRE payments for each crop–state combination does not include the impact of the limit on ACRE payments per payment entity. The payment limit for one payment entity is included in the calculation of ACRE payments for the farm.
[d] Number of farms in the Illinois data set is 560. All planted corn and soybeans; 115 had enough information on wheat yields to be included in the analysis for at least 1 of the 12 years.
[e] Number of farms in the Kansas data set is 482. Numbers of Kansas farms by crop are dryland corn (103), irrigated corn (42), grain sorghum (168), soybeans (235), and wheat (326).
Sources: Original calculations using data from the Illinois Farm Business Farm Management (FBFM) program, the Kansas Farm Management Association (KFMA), and the U.S. Department of Agriculture, National Agricultural Statistical Service.

than 75% CRCP on minimum revenue for the Illinois farms, whereas the reverse was found for the Kansas farms (see Table 6). When added to the estimated cash receipts from the crops included in this study, average annual minimum farm revenue increased by 5% for the Illinois farms when ACRE was included compared with a 2% increase when 75% CRCP was included. For the Kansas farms, average minimum revenue increased 24% with 75% CRCP compared with 11% with ACRE. Note that although the average dollar amount of ACRE revenue payments was greater in Illinois, the relative impact of the ACRE payments on minimum revenue was greater in Kansas.

When viewed as a supplement to crop insurance, SURE increased average minimum farm revenue by one percentage point for the Illinois farms and by three percentage points for the Kansas farms. Also, for both the Illinois and Kansas farms, the combination of ACRE and 75% CRCP increased average minimum farm revenue by more percentage points than the combination of 75% CRCP and SURE.

Overlap in Payments between ACRE and Crop Revenue Insurance

In determining payments by SURE, crop insurance indemnity payments and ACRE revenue payments are added to the farm's realized revenue. This addition is intended to prevent a farmer or landowner from receiving multiple payments from the Federal government for the same loss.[6] No such adjustment occurs when

[6] For the farms and years in this study, not subtracting ACRE payments from SURE payments would increase SURE payments by 74%, from $17.1 to $29.8 million. Not subtracting 75% CRCP payments from SURE payments would increase SURE payments by 181%, from $17.1 to $48.1 million.

Table 6. Impact of Revenue Risk Management Programs on Average Minimum Revenue per Farm, Illinois and Kansas, 1996–2007 Crop Years

State	Crop Receipts[a]	Crop Receipts[a]+ Net 75% CRCP[b]	Crop Receipts[a]+ Net 75% CRCP[b]+ SURE	Crop Receipts[a]+ ACRE	Crop Receipts[a]+ ACRE + Net 75% CRCP[b]	Crop Receipts[a]+ ACRE + Net 75% CRCP[b]+ SURE
			Panel A: dollars per farm			
Illinois[c]	$192,869	$196,639	$199,576	$202,973	$206,593	$209,745
Kansas[d]	$68,921	$85,748	$87,699	$76,373	$92,321	$94,311
			Panel B: percent increase relative to crop receipts			
Illinois[c]		+2%	+3%	+5%	+7%	+9%
Kansas[d]		+24%	+27%	+11%	+34%	+37%

[a] Receipts for an individual crop on a farm were estimated by multiplying state average price for the crop marketing year by the farm's yield per planted acre for the crop marketing year times the farm's planted acres. Receipts for the farm were summed across corn, grain sorghum, soybeans, and wheat planted on the farm.

[b] CRCP is Crop Revenue Coverage Insurance. Net insurance indemnities were calculated assuming that the farm operator or landlord elected enterprise unit insurance and that insurance premiums were fair over the study period. Based on provisions in the 2008 Farm Bill, the premium subsidy for enterprise crop insurance at the 75% coverage level is 77% (Barnaby, 2010a).

[c] Number of farms in the Illinois data set is 560. All planted corn and soybeans; 115 had enough information on wheat yields to be included in the analysis for at least 1 of the 12 years.

[d] Number of farms in the Kansas data set is 482. Numbers of Kansas farms by crop are dryland corn (103), irrigated corn (42), grain sorghum (168), soybeans (235), and wheat (326).

Sources: Original calculations using data from the Illinois Farm Business Farm Management (FBFM) program, the Kansas Farm Management Association (KFMA), and the U.S. Department of Agriculture, National Agricultural Statistical Service.

determining payments by ACRE. Hence, concern exists over the potential for overlapping payments by crop insurance and ACRE.

In the context of this study, one approach to examining this concern is to compare payments from 75% CRCP and ACRE. When both programs make payments to the same crop in the same crop year, the smaller of the two payments is the overlap in payments. Summed across all crops, years, farms, and states, this measure of the overlap in payments equals 22% of ACRE revenue payments (see Table 7).

However, this measure misses an important consideration. Just because both insurance and ACRE make a payment to the same crop in the same crop year does not mean that the payments are for the same loss. The two payments may be for different losses that result from coverage of different parts of the revenue risk distribution.

To illustrate, assume that the distribution of expected revenue for a crop and crop year are identical for the farm and state. Also assume that the farm's mean expected revenue equals the state's mean expected revenue equals the product of the crop's preplant insurance price times the farm's APH insurance yield (i.e., the farm's revenue insurance guarantee) equals the farm's ACRE benchmark revenue equals the product of the state's 5-year Olympic moving average yield times the U.S. 2-year moving average price. Last, assume that realized revenue for the farm and state is 50% less than their mean expected revenue.

Given these assumptions, 75% CRCP will make payments because revenue is less than 75% of the farm's revenue insurance guarantee, which also equals the farm's expected revenue. ACRE also will make payments because the state's ACRE revenue is less than the state's ACRE revenue risk assistance level and because the farm's revenue is less than the farm's benchmark revenue. However, the ACRE state revenue payment is capped at 25% of the state's ACRE revenue risk assistance level. Given the assumptions in this situation, the ACRE state revenue payment reaches its 25% cap when realized state ACRE revenue equals 67.5% of the state's expected revenue (90% minus [25% times 90%]).

Thus, in this situation, only ACRE will make payments for the farm's shortfall in revenue that lie between 75% and 90% of the farm's expected revenue. Only 75% CRCP will

Table 7. Measures of Average Annual per Farm Overlap Between ACRE and 75% Coverage Crop Revenue Coverage Insurance (CRCP), Illinois and Kansas, 1996–2007 Crop Years

State and Crop	ACRE Revenue Payment	Overlap in ACRE and 75% CRCP Payments for Same Crop Year	ACRE Payment Exceeding 15% of CRCP Guarantee for Same Crop Year
Illinois[a]			
Corn	$4,436	$560	$0
Soybeans	$2,730	$118	$6
Wheat	$265	$109	$1
Kansas[b]			
Dryland corn	$1,513	$925	$0
Irrigated corn	$1,021	$120	$0
Sorghum	$1,659	$969	$0
Soybeans	$4,357	$2,328	$733
Wheat	$462	$180	$0
All crops			
Illinois farms	$7,093	$691	$6
Kansas farms	$3,392	$1,803	$358
All farms	$5,381	$1,205	$180

[a] Number of farms in the Illinois data set is 560. All planted corn and soybeans; 115 had enough information on wheat yields to be included in the analysis for at least 1 of the 12 years.
[b] Number of farms in the Kansas data set is 482. Numbers of Kansas farms by crop are dryland corn (103), irrigated corn (42), grain sorghum (168), soybeans (235), and wheat (326).
Sources: Original calculations using data from the Illinois Farm Business Farm Management (FBFM) program, the Kansas Farm Management Association (KFMA), and the U.S. Department of Agriculture, National Agricultural Statistical Service.

make payments for the farm's shortfall in revenue that lie between 50% and 67.5% of the farm's expected revenue. Both ACRE and 75% CRCP will make payments for the farm's shortfall in revenue between 67.5% and 75% of the farm's expected revenue. Hence, although both 75% CRCP and ACRE make payments to the same crop in the same crop years in this stylized situation, most of the payments cover different parts of the revenue risk distribution and thus do not overlap from a risk management perspective. It is the overlap in payments for the same part of the revenue risk distribution that is the key policy issue.

Estimation of the overlap in payments from ACRE and crop revenue insurance that result from an overlap in covering the same part of the revenue risk distribution requires a complex simulation analysis. Among the factors that need to be taken into account are the mean, variance, and other moments of the state and farm revenue distributions as well as the coverage level of insurance elected by the farmer. However, this illustration suggests that, in the context of this study, a simple approximation to the amount of overlap in payments from 75% CRCP and ACRE for the same part of the revenue risk distribution is to determine if the payments from ACRE exceed 15% of CRCP's revenue guarantee. Fifteen percent is the difference between ACRE's 90% coverage level and CRCP's 75% coverage level modeled in this study. In other words, did ACRE payments exceed the 25% deductible of 75% CRCP taking into account ACRE's 10% deductible? Summed across all crops, years, farms, and states, this measure is estimated to be 3% of ACRE revenue payments (see Table 7), much smaller than the earlier estimate of a 22% overlap in payments. The finding of a small estimated overlap in payments resulting from an overlap in coverage of the same part of the revenue risk distribution is consistent with Barnaby's (2010b) argument.

Summary and Discussion of Policy Issues

The 2008 Farm Bill authorized a new disaster assistance program, SURE, and a new farm program option, ACRE. Like crop revenue insurance,

SURE and ACRE are designed to help farmers manage revenue risk. This study examines the interactions among these three revenue risk management programs using farm level data from Illinois and Kansas for the 1991–2007 crops.

Insurance is modeled as 75% coverage CRCP. Average annual gross indemnities from 75% CRCP varied substantively between the two states: $9,834 per Kansas farm vs. $2,329 per Illinois farm. Moreover, payments by 75% CRCP increased average minimum farm revenue by 24% for the Kansas farms in this study, but only by 2% for the Illinois farms in this study. These stark differences can be explained, at least in part, by the greater idiosyncratic farm-level yield risk in Kansas.

During the 2008 Farm Bill debate, a rationale often stated by corn belt farmers for supporting ACRE was that neither crop insurance nor the counter-cyclical program addressed the revenue risks they faced, especially with market prices above the counter-cyclical target prices. Since its introduction in the 2002 crop year, the counter-cyclical program has made payments in only 2 years (2004 and 2005) to only two of the crops examined in this study (corn and grain sorghum) (USDA, FSA, 2010). In contrast, over the 2002–2008 crop years, counter-cyclical payments have been made in each year to cotton, in all but 1 year to peanuts, and in 4 years to rice. The much larger impact of 75% CRCP on the Kansas farms than on the Illinois farms in this study and the history of counter-cyclical payments are both consistent with the policy dynamics that characterized the debate on ACRE.

ACRE seeks to address holes that exist in the current farm safety net. A hole of particular concern is a large decline in revenue that extends over several years when prices are above the marketing loan rate and the counter-cyclical target price. This study estimates that ACRE will provide more payments to Illinois farms than to Kansas farms. ACRE also increased the average annual minimum revenue level of Illinois farms by more than crop insurance and SURE combined. Thus, this study finds that ACRE addresses at least some of the regional disparity that has existed within the traditional farm safety net programs.

Concern exists that ACRE revenue payments duplicate payments from revenue insurance. Although both programs can make payments to the same crop in the same year, the payments may not be for the same part of the revenue risk distribution. A simple estimate is made of the amount of the overlap in payments from ACRE and 75% CRCP associated with an overlap in covering the same part of the revenue risk distribution. This overlap in payments is estimated to be less than 5% of ACRE payments. It is important to note that the overlap is dependent on the insurance coverage level with the overlap expected to be larger at higher insurance coverage levels and smaller at lower insurance coverage levels.

Turning to policy recommendations for improving the farm safety net, the farm financial crisis of the 1980s and other financial crises reveal that timely delivery of assistance is important to help recipient businesses survive a disaster. SURE's ability to help farmers suffering from physical production disasters would be enhanced by making SURE payments at the same time as insurance payments rather than waiting until after the crop year ends. This objective could be implemented by using crop insurance harvest prices instead of crop marketing year prices when determining SURE payments. This policy change was estimated to reduce SURE payments to the farms in this study by 35%. The reduction occurred because harvest insurance futures prices are, on average, higher than the marketing year's average cash price as a result of the normal basis differential that exists between futures and cash prices. Thus, this proposed policy change would not only result in more timely disaster assistance payments, but also notable budget savings. ACRE would continue to provide assistance for postharvest revenue risk factors. However, it would be necessary to take SURE payments into account when determining ACRE payments to maintain the budget savings that result from the current requirement to add ACRE payments to farm revenue when calculating SURE payments.

This study finds that ACRE increased average minimum farm revenue to both Illinois and Kansas farmers. Of particular note, ACRE

increased average minimum farm revenue of the Kansas farms by 10 percentage points above their average minimum revenue with 75% CRCP. Thus, a farm program designed to help farmers manage systemic revenue risk had risk management value to farmers, even where idiosyncratic yield risk was substantial.

Farmers and landowners must weigh these risk management benefits of ACRE against the costs of electing ACRE over the traditional farm programs. Direct payments are reduced by 20% and ACRE's marketing loan rate is 30% lower than the traditional marketing loan rate. In addition, a farm eligibility condition exists for the ACRE revenue program but not for other farm programs.

The 30% reduction in the marketing loan rate effectively means the ACRE program suite has no marketing loan program because the probability that prices will ever be 30% below the loan rate is close to if not zero. Thus, the ACRE revenue program replaces both the marketing loan and the counter-cyclical program. Imposing a limit on ACRE revenue payments equal to $65,000 plus the farm's reduction in direct payments is consistent with ACRE replacing part of the direct payment program and the counter-cyclical program, which also has a $65,000 limit on payments. However, imposing a limit on ACRE revenue payments is not consistent with ACRE replacing the marketing loan program, which has no payment limit. A consistent set of program rules would either set the ACRE marketing loan rate equal to the traditional marketing loan rate or have no limit on ACRE revenue payments.[7]

Based on the farms, years, and program modeled in this study, eliminating the farm eligibility condition would have increased ACRE payments by 10%. If the farm eligibility condition is retained for ACRE, then calculation of ACRE's state revenue risk assistance level and farm revenue benchmark revenue should be made consistent. In particular, although a 10% cap and 10% cup exist on the annual change in the ACRE state revenue assistance level, no cup and cap exists on the annual change in the ACRE farm revenue benchmark. This inconsistency can result in a farm not meeting ACRE's farm eligibility condition when an ACRE state revenue payment is made because the farm benchmark revenue declined more than the state revenue risk assistance level. Based on the farms, years, and program modeled in this study, a 10% cap and cup on the annual change in the ACRE farm benchmark revenue would have increased ACRE revenue payments by 4%.

In conclusion, the results of this study are consistent with the common sense notion that revenue risks differ by geographic area. Crop insurance is an effective tool for addressing idiosyncratic yield risk such as exists in Kansas. The marketing loan program and counter-cyclical programs are effective tools for addressing surplus supply conditions such as continue to exist for cotton and peanuts. However, a hole exists in this traditional farm safety net when surplus production is replaced by dynamic markets that have prices above the marketing loan and counter-cyclical support rates. In this situation, multiple-year, sizable declines in revenue resulting from systemic risks can occur without the marketing loan, counter-cyclical, or crop insurance programs providing effective risk management assistance. ACRE is an attempt to address this hole in the traditional farm safety net. ACRE may or may not be the right answer, but the question it seeks to address remains a key policy question as we approach the next farm bill.

[7] Based on the farms, years, and program modeled in this study, ACRE revenue payments would have increased by approximately 1% if no payment limit existed.

References

Barnaby, A. "Should Basic Underwriting Rules Be Applied to ACRE and SURE?" *Journal of Agricultural and Applied Economics* 42,3(2010a):517–35.

———. Personal Communication. Information on crop insurance subsidy levels. Kansas State University, Department of Agricultural Economics. February 2010b.

Kansas State University, Department of Agricultural Economics. "AgManager.info, Crops: Insurance and Risk." (Data are compiled by Art Barnaby.) Internet site: www.agmanager.info/

crops/insurance/workshops/ (Accessed November 2009).

Langemeier, M. "Comparison of 2002 Census and KFMA Farms," Kansas State University, Department of Agricultural Economics, Staff Paper No. 06-01, December 2005.

———. Personal Communication. Data from Kansas Farm Management Association (KFMA). Kansas State University, Department of Agricultural Economics. June 2009.

Nelson, F., and L. Schertz (editors). *Provisions of the Federal Agriculture Improvement and Reform Act of 1996*. Washington, DC: U.S. Department of Agriculture (USDA), Economic Research Service, Agriculture Information Bulletin No. 729, September 1996.

Orden, D., R. Paarlberg, and T. Roe. *Policy Reform in American Agriculture*. Chicago, IL: University of Chicago Press, 1999.

Schertz, L., and O. Doering. *The Making of the 1996 Farm Act*. Ames, IA: Iowa State University Press, 1999.

Schnitkey, G. Personal Communication. Data from Illinois Farm Business Farm Management (FBFM) program. University of Illinois at Urbana–Champaign, Department of Agricultural and Consumer Economics. June 2009.

U.S. Congress. *Food, Conservation, and Energy Act of 2008*. H.R. 2419. Internet site: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:h2419enr.txt.pdf (Accessed December 30, 2008).

U.S. Department of Agriculture (USDA), Economic Research Service. "Farm Program Acres: Download Data." Internet site: www.ers.usda.gov/Data/BaseAcres/Download.aspx (Accessed November 2009).

U.S. Department of Agriculture (USDA), Farm Service Agency (FSA). "Direct and Counter-Cyclical Program/ACRE." Internet site: www.fsa.usda.gov/FSA/webapp?area=home&subject=dccp&topic=landing (Accessed November 2009).

———. "Disaster Assistance Programs." Internet site: www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=sure (Accessed January 2010).

U.S. Department of Agriculture (USDA), National Agricultural Statistics Service. "2007 Census of Agriculture." Internet site: www.agcensus.usda.gov/ (Accessed February 2010).

———. "Data and Statistics: Quick Stats." Internet site: www.nass.usda.gov/Data_and_Statistics/Quick_Stats/index.asp (Accessed November 2009).

U.S. Department of Agriculture (USDA), Risk Management Agency. "Crop Policies and Pilots." Internet site: www.rma.usda.gov/policies/ (Accessed January 2010).

Zulauf, C., M.R. Dicks, and J.D. Vitale. "ACRE (Average Crop Revenue Election) Farm Program: Provisions, Policy Background, and Farm Decision Analysis." *Choices: The Magazine of Food, Farm & Resource Issues* 23(2008):29–35.